

Claims

What is claimed is:

- 1 1. A thermal management apparatus, comprising:
2 a carrier substrate having a first side and an opposite second side and an
3 opening extending from the first side to the second side; and
4 a thermal conductor dimensioned to fit in the opening to facilitate transfer of heat
5 generated by an electronic component attached to the first side for dissipation at the
6 second side.
- 1 2. The thermal management apparatus of Claim 1, further comprising a first heat
2 dissipation device couple to the electronic component and the thermal conductor, and
3 configured to transfer heat generated by the electronic component to the thermal
4 conductor.
- 1 3. The thermal management apparatus of Claim 2, wherein the first heat dissipation
2 device is one of a low profile heat sink and heat spreader.
- 1 4. The thermal management apparatus of Claim 2, wherein the carrier substrate is
2 at least part compliant with a standard and the aggregate thickness of the component
3 and the first heat dissipation device is within a dimension requirement of the standard.
- 1 5. The thermal management apparatus of Claim 4, wherein the standard is PICMG
2 3.0 ATCA, and the dimension requirement is 4.66mm.

1 6. The thermal management apparatus of Claim 5, wherein first side is covered with
2 a nonconductive material and the aggregate thickness of the nonconductive material,
3 the component, and the first heat dissipation device is less than or equal to 4.66 mm.

1 7. The thermal management apparatus of Claim 1, wherein the one or more thermal
2 conductors are a selected one of a solid core conductor, a liquid filled conductor and a
3 heat pipe.

1 8. The thermal management apparatus of claim 1, wherein the device further
2 comprises a second heat dissipation device disposed on the second side and thermally
3 coupled to the one or more thermal conductors to dissipate said heat transferred away
4 from the component disposed on the first side.

1 9. The thermal management apparatus of Claim 8 wherein the second heat
2 dissipation device is configured to transfer heat to a surrounding environment.

1 10. The thermal management apparatus of Claim 9, wherein the second heat
2 dissipation device is one of an air cooled, liquid cooled, thermoelectric, and phase
3 change device.

1 11. The thermal management apparatus of Claim 8, wherein the second heat
2 dissipation device is removably coupled to the thermal conductors by fasteners and
3 retains the first heat dissipation device against the first side component.

1 12. The thermal management apparatus of Claim 8 wherein the second heat
2 dissipation device is configured to thermally couple to a component disposed on the
3 second side.

1 13. A modular platform, comprising:
2 a shelf;
3 a plurality of modular platform boards, at least one of the boards including a
4 thermal management apparatus, the thermal management apparatus comprising
5 a carrier substrate having a first side and an opposite second side and an
6 opening extending from the first side to the second side; and
7 a thermal conductor dimensioned to fit in the opening to facilitate transfer of heat
8 generated by an electronic component attached to the first side for dissipation at the
9 second side.

1 14. The modular platform of Claim 13, further comprising a first heat dissipation
2 device couple to the electronic component and the thermal conductor, and configured
3 to transfer heat generated by the electronic component to the thermal conductor.

1 15. The modular platform of Claim 14, wherein the first heat dissipation device is one
2 of a low profile heat sink and heat spreader.

1 16. The modular platform of Claim 14, wherein the carrier substrate is at least part
2 compliant with a standard and the aggregate thickness of the component and the first
3 heat dissipation device is within a dimension requirement of the standard.

1 17. The modular platform of Claim 16, wherein the standard is PICMG 3.0 ATCA,
2 and the dimension requirement is 4.66mm.

1 18. The modular platform of Claim 17, wherein first side is covered with a
2 nonconductive material and the aggregate thickness of the nonconductive material, the
3 component, and the first heat dissipation device is less than or equal to 4.66 mm.

1 19. The modular platform of Claim 13, wherein the one or more thermal conductors
2 are a selected one of a solid core conductor, a liquid filled conductor and a heat pipe.

1 20. The modular platform of claim 13 wherein the device further comprises a second
2 heat dissipation device disposed on the second side and thermally coupled to the one
3 or more thermal conductors to dissipate said heat transferred away from the component
4 disposed on the first side.

1 21. The modular platform of Claim 20 wherein the second heat dissipation device is
2 configured to transfer heat to a surrounding environment.

22. The modular platform of Claim 21, wherein the second heat dissipation device is one of an air cooled, liquid cooled, thermoelectric, and phase change devices.

23. The modular platform of Claim 20, wherein the second heat dissipation device is removably coupled to the thermal conductors.

24. The modular platform of Claim 20 wherein the second heat dissipation device is configured to thermally couple to a component disposed on the second side.

25. A thermal management method, comprising:
providing a carrier substrate having a first side and an opposite second side and an opening extending from the first side to the second side, and an electronic component coupled to the first side;
providing a thermal conductor dimensioned to fit in the opening to facilitate transfer of heat generated by an electronic component attached to the first side for dissipation at the second side; and
transferring heat from the electronic component to the second side via the thermal conductor.

26. The method of Claim 25, further comprising:
providing a first heat dissipation device coupled to the electronic component; and
coupling the first heat dissipation device to the thermal conductor.

- 1 27. The method of Claim 25, further comprising:
- 2 providing a second heat dissipation device;
- 3 coupling the second heat dissipation device to the thermal conductor on the
- 4 second side;
- 5 transferring heat from the thermal conductor to the second heat dissipation
- 6 device; and
- 7 transferring heat from the second heat dissipation device to a surrounding
- 8 environment.